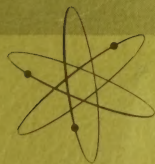


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HEATHKIT® ASSEMBLY MANUAL



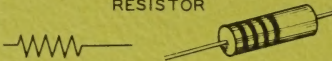
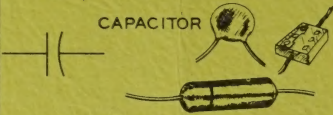
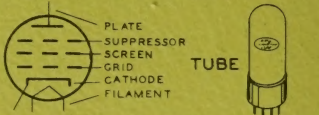

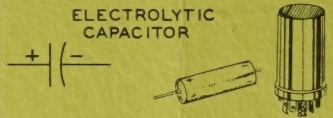

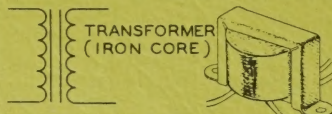

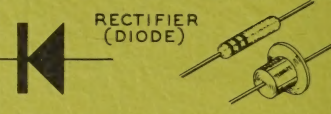
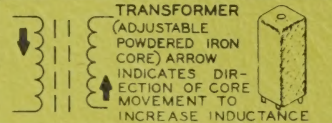

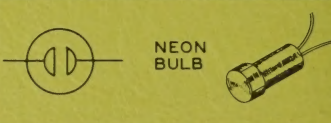
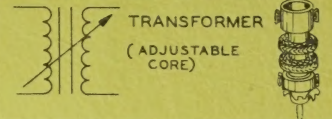
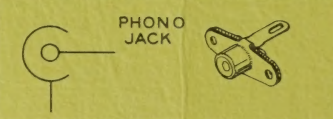
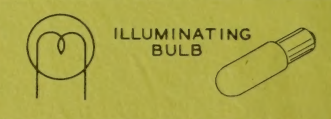
VIBRATOR POWER SUPPLY

MODEL GP-11

TYPICAL COMPONENT TYPES

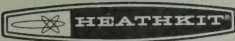
This chart is a guide to commonly used types of electronic components. The symbols and related illustrations

should prove helpful in identifying most parts and reading the schematic diagrams.

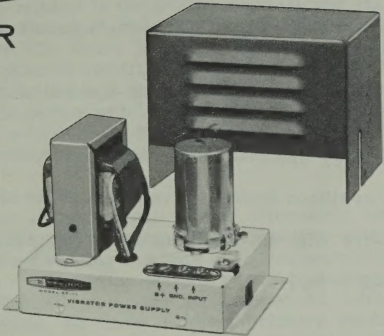
<p style="text-align: center;">RESISTOR</p> 	<p style="text-align: center;">CAPACITOR</p> 	<p style="text-align: center;">TUBE</p> 
<p style="text-align: center;">POTENTIOMETER (CONTROL)</p> 	<p style="text-align: center;">ELECTROLYTIC CAPACITOR</p> 	<p style="text-align: center;">TRANSISTOR</p> 
<p style="text-align: center;">TRANSFORMER (IRON CORE)</p> 	<p style="text-align: center;">VARIABLE CAPACITOR</p> 	<p style="text-align: center;">RECTIFIER (DIODE)</p> 
<p style="text-align: center;">TRANSFORMER (ADJUSTABLE POWDERED IRON CORE) ARROW INDICATES DIR- ECTION OF CORE MOVEMENT TO INCREASE INDUCTANCE</p> 	<p style="text-align: center;">BATTERY</p> 	<p style="text-align: center;">NEON BULB</p> 
<p style="text-align: center;">TRANSFORMER (ADJUSTABLE CORE)</p> 	<p style="text-align: center;">PHONO JACK</p> 	<p style="text-align: center;">ILLUMINATING BULB</p> 

Continued on Back Cover

Assembly and
Operation of the



VIBRATOR
POWER
SUPPLY
MODEL GP-11



The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

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HEATH COMPANY
BENTON HARBOR,
MICHIGAN

SPECIFICATIONS

Power Output

Nominal rating: 250 volts DC at 100 milliamperes, ICAS (Intermittent Commercial or Amateur Service).

Power Requirements

12-Volt Operation

16 volts maximum, 12.6 volts nominal at 3 amperes for rated output.

6-Volt Operation

8 volts maximum, 6.3 volts nominal at 6.5 amperes for rated output.

Vibrator

Mallory type 1610, or equivalent.

Rectifier

Two silicon diodes in a voltage-doubler circuit.

Dimensions

4-5/8" high x 6-1/2" wide x 4-1/8" deep.

Net Weight

4-3/4 lbs.

INTRODUCTION

The HEATHKIT Model GP-11 Vibrator Power Supply is a compact, dependable, low-cost source of B+ voltage, intended for use with equipment requiring up to 100 milliamperes of B+ current. Many of the low-power Amateur and Citizens Band transceivers fall into this category. It can be operated from either a 6-volt or 12-volt DC power source, such as a storage battery. Because of its

small physical size, the Power Supply is ideal for limited-space installations in cars, trucks, boats, etc. Since the Power Supply can be switched on and off remotely, it may be mounted at some convenient location away from the equipment to which it supplies B+ voltage.

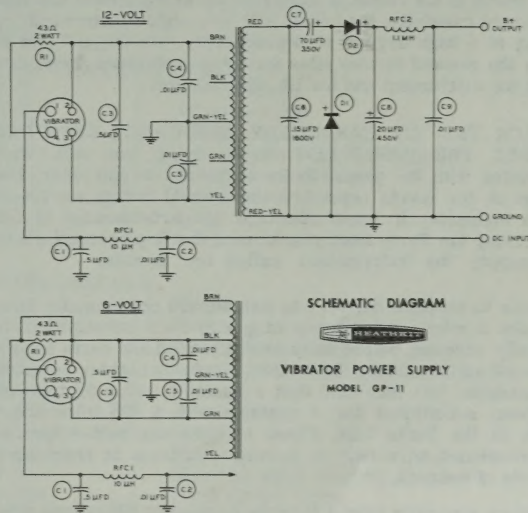
CIRCUIT DESCRIPTION

To better understand how the Power Supply works, follow the circuit on the Schematic Diagram while reading this description.

DC source voltage is applied to the INPUT terminal, and via a hash filter network consisting of choke RFC1 and capacitors C1 and C2, to the vibrator. The Power Supply can be wired to operate from either a 6-volt or 12-volt DC source. In either case, the vibrator coil is operated from 6 volts. For 12-volt operation, resistor R1 is used in series with the vibrator coil to drop the voltage applied to the coil to 6 volts. For 6-volt operation, a wire is connected across resistor R1, and 6 volts is applied directly to the vibrator coil.

The vibrator acts as a mechanical switch, alternately connecting and disconnecting the voltage source to opposite ends of the transformer primary winding at a rate of approximately 115 cps. This results in a rectangular waveform which, due to the step-up effect of the transformer, appears as a high AC voltage in the secondary winding. By using different primary winding taps for 6-volt and 12-volt operation, the step-up ratio of the transformer can be changed so that the same secondary AC voltage results in either case. Buffer capacitor C6 is connected directly across the secondary winding.

AC voltage is applied from the secondary winding, through capacitor C7 to silicon diodes D1 and D2. These diodes with capacitors C7 and C8 are arranged in a half-wave voltage-doubler circuit. Choke RFC2 and capacitor C9 provide hash filtering for the B+ voltage as it is applied to the B+ output terminal.



CONSTRUCTION NOTES

This manual is supplied to assist you in every way to complete your kit with the least possible chance for error. The arrangement shown is the result of extensive experimentation and trial. If followed carefully, the result will be a stable instrument, operating at a high degree of dependability. We suggest that you retain the manual in your files for future reference, both in the use of the instrument and for its maintenance.

UNPACK THE KIT CAREFULLY AND CHECK EACH PART AGAINST THE PARTS LIST. In so doing, you will become acquainted with the parts. Refer to the charts and other information on the inside covers of the manual to help you identify the components. If some shortage or parts damage is found in checking the Parts List, please read the Replacement section and supply the information called for therein.

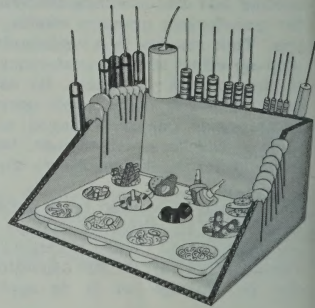
In order to expedite delivery to you, we are occasionally forced to make a minor substitution of parts. Such substitutions are carefully checked before they are approved and parts supplied will work satisfactorily. In checking the Parts List for resistors, for example, you may find that a resistor with a 5% tolerance has been substituted for a resistor with a 10% tolerance, as shown in the Parts List. These changes are self-evident and are mentioned here only to prevent confusion in checking the contents of your kit.

Resistors generally have a tolerance rating of 10% unless otherwise stated in the Parts List. Tolerances on capacitors are generally even greater. Limits of +100% and -20% are common for electrolytic capacitors.

We suggest that you do the following before work is started:

1. Lay out all parts so that they are readily available.
2. Provide yourself with good quality tools. Basic tool requirements consist of a screwdriver with a 1/4" blade; long-nose pliers; wire cutters, preferably separate diagonal cutters; a pen knife or a tool for stripping insulation from wires; a soldering iron (or gun) and rosin core solder. A set of nut drivers and a nut starter, while not necessary, will aid extensively in construction of the kit.

Most kit builders find it helpful to separate the various small parts into convenient categories. Muffin tins or molded egg cartons make convenient trays for small parts. Resistors and capacitors may be placed with their lead end inserted in the edge of a piece of corrugated cardboard until they are needed. Values can be written on the cardboard next to each component. The illustration shows one method that may be used.



PARTS LIST

Refer to the Parts Pictorial which folds out from Page 7.

PART No.	PARTS Per Kit	DESCRIPTION
-------------	------------------	-------------

RESISTOR-CAPACITORS

1-25-2	1	43 Ω , 2 watt resistor (yellow-orange-black)
21-16	4	.01 μ fd capacitor-disc ceramic
23-56	2	.5 μ fd, 200 V capacitor-tubular
23-94	1	.15 μ fd, 1600 V oil-impregnated capacitor-tubular
25-33	1	20 μ fd, 450 V capacitor-electrolytic
25-43	1	70 μ fd, 350 V capacitor-electrolytic

CHOKES-TRANSFORMER-DIODES

45-4	1	RF choke, 1.1 millihenry
45-20	1	RF choke, 10 microhenry
55-7	1	Transformer
57-27	2	Silicon diode

HARDWARE

250-10	3	6-32 x 1/2" screw
250-56	10	6-32 x 1/4" screw
250-79	1	6-32 x 1-1/4" screw
252-3	7	6-32 nut
252-22	7	6-32 speednut
253-6	2	#10 fiber washer
254-1	11	#6 lockwasher

PART No.	PARTS Per Kit	DESCRIPTION
-------------	------------------	-------------

CLAMP-SOCKET-TERMINAL STRIPS

207-5	1	Plastic clamp
207-6	1	Vibrator clamp
434-27	1	Vibrator socket
431-8	1	3-lug screw terminal strip
431-10	1	3-lug terminal strip
431-11	1	5-lug terminal strip
431-15	1	1-lug terminal strip
431-16	1	2-lug terminal strip

MISCELLANEOUS

68-5	1	Vibrator
73-1	2	Rubber grommet
344-6	1	Length #18 hookup wire
346-1	1	Length insulating sleeving
200-304-1	1	Chassis
205-310-1	1	Bottom plate
90-178-1	1	Cover
331-6		Solder
391-34	1	Blue and white identification label
597-260	1	Parts Order Form
595-448	1	Manual

PROPER SOLDERING TECHNIQUES

Only a small percentage of HEATHKIT equipment purchasers find it necessary to return an instrument for factory service. Of these instruments, by far the largest portion of malfunctions are due to poor or improper soldering.

If terminals are bright, and clean and free of frayed insulation and other foreign substances, no difficulty will be experienced in soldering. Correctly soldered connections are essential if the performance engineered into this kit is to be fully realized. If you are a beginner with no experience in soldering, a half hour's practice with some odd lengths of wire may be a worthwhile investment.

For most wiring, a 25 to 100 watt iron or its equivalent in a soldering gun is very satisfactory. A lower wattage iron than this may not heat the connection enough to flow the solder smoothly over the joint. Keep the iron tip clean and bright by wiping it from time to time with a cloth.

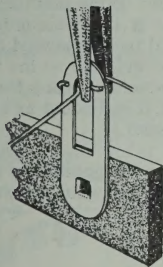
CHASSIS WIRING AND SOLDERING

1. Unless otherwise indicated, all wire used is the type with colored insulation (hookup wire). In preparing a length of hookup wire, 1/4" of insulation should be removed from each end unless directed otherwise in the construction step.
2. To avoid breaking internal connections when stripping insulation from the leads of transformers or similar components, care should be taken not to pull directly on the lead. Instead, hold the lead with pliers while it is being stripped.
3. Leads on resistors, capacitors and similar components are generally much longer than they need to be to make the required connections. In these cases, the leads should be cut to proper length before the part is added to the chassis.
4. Wherever there is a possibility of bare leads shorting to other parts or to the chassis, the leads should be covered with insulating sleeving. Where the use of sleeving is specifically intended, the phrase "use sleeving" is included in the associated construction step. In any case where there is the possibility of an unintentional short circuit, sleeving should be used. Extra sleeving is provided for this purpose.
5. Crimp or bend the lead (or leads) around the terminal to form a good joint without relying on solder for physical strength. If the wire is too large to allow bending or if the step states that the wire is not to be crimped, position the wire so that a good solder connection can still be made.

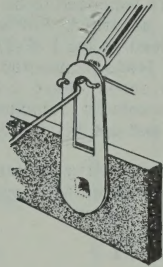
6. Position the work, if possible, so that gravity will help to keep the solder where you want it.
7. Place a flat side of the soldering iron tip against the joint to be soldered until it is heated sufficiently to melt the solder.
8. Then place the solder against the heated terminal and it will immediately flow over the joint; use only enough solder to fill the entire hole in the terminal with solder.

9. Remove the solder and then the iron from the completed junction. Use care not to move the leads until the solder is solidified.

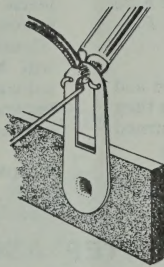
A poor or cold solder joint will usually look crystalline and have a grainy texture, or the solder will stand up in a blob and will not have adhered to the joint. Such joints should be reheated until the solder flows smoothly over the entire junction. In some cases, it may be necessary to add a little more solder to achieve a smooth bright appearance.



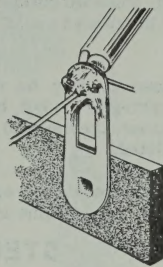
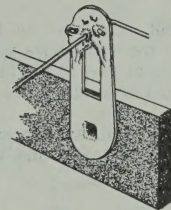
CRIMP WIRES



HEAT CONNECTION



APPLY SOLDER

ALLOW SOLDER
TO FLOWPROPER SOLDER
CONNECTION

ROSIN CORE SOLDER HAS BEEN SUPPLIED WITH THIS KIT. THIS TYPE OF SOLDER MUST BE USED FOR ALL SOLDERING IN THIS KIT. ALL GUARANTEES ARE VOIDED AND WE WILL NOT REPAIR OR SERVICE EQUIPMENT IN WHICH ACID CORE SOLDER OR PASTE FLUXES HAVE BEEN USED. IF ADDITIONAL SOLDER IS NEEDED, BE SURE TO PURCHASE ROSIN CORE (60:40 or 50:50 TIN-LEAD CONTENT) RADIO TYPE SOLDER.

PROPER SOLDERING TECHNIQUES

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For most wiring, a 25 to 100 watt iron or its equivalent in a soldering gun is very satisfactory. A lower wattage iron than this may not heat the connection enough to flow the solder smoothly over the joint. Keep the iron tip clean and bright by wiping it from time to time with a cloth.

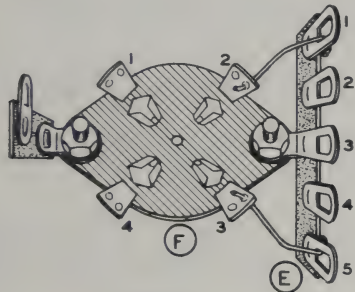
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5. Crimp or bend the lead (or leads) around the terminal to form a good joint without relying on solder for physical strength. If the wire is too large to allow bending or if the step states that the wire is not to be crimped, position the wire so that a good solder connection can still be made.

12-VOLT OPERATION (Refer to Detail 2A).

NOTE: Use stripped hookup wire when bare wire is called for in the next two steps.



Detail 2A

- (✓) Connect a bare wire from lug 3 of vibrator socket F (NS) to lug 5 of terminal strip E (S-2).

- (✓) Connect a bare wire from lug 2 of vibrator socket F (NS) to lug 1 of terminal strip E (S-2).

- (✓) Now solder lugs 2 (S-1) and 4 (S-1) of terminal strip E.

6-VOLT OPERATION (Refer to Detail 2B).

- () Connect a 1-3/4" length of hookup wire from lug 4 (NS) to lug 2 (NS) of vibrator socket F. Dress this wire down against the socket as shown.

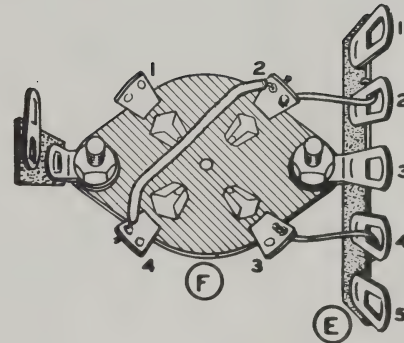
NOTE: Use stripped hookup wire when bare wire is called for in the next two steps.

- () Connect a bare wire from lug 3 of vibrator socket F (NS) to lug 4 of terminal strip E (S-2).

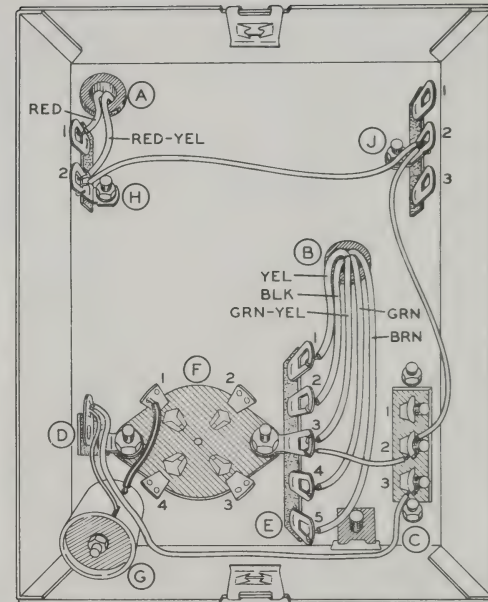
- () Connect a bare wire from lug 2 of vibrator socket F (NS) to lug 2 of terminal strip E (S-2).

- () Now solder lugs 1 (S-1) and 5 (S-1) of terminal strip E.

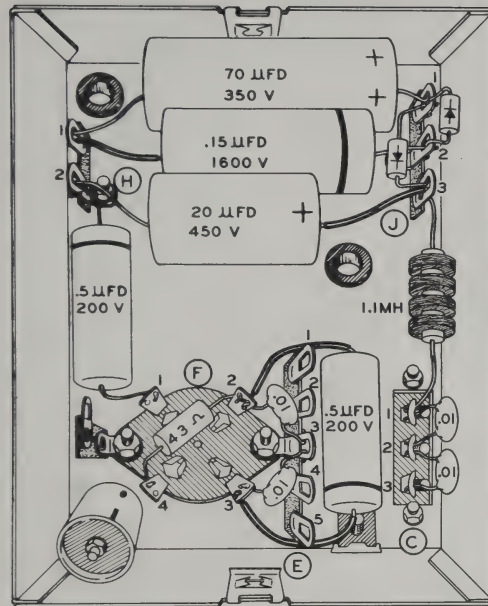
This completes the steps which determine the operating voltage of the Power Supply. The following steps apply to both the 12-volt and 6-volt versions.



Detail 2B



Pictorial 2



Pictorial 3

Refer to Pictorial 3 for the following steps.

NOTE: The positive (+) end of each electrolytic capacitor and the banded (or shouldered) end of each tubular capacitor should be placed as shown in Pictorial 3.

- (✓) C7. Connect the 70 μ fd electrolytic capacitor from lug 1 of terminal strip H (NS) to lug 1 of terminal strip J (NS). The positive (+) lead goes to terminal strip J. Place the body of this capacitor against the end of the chassis as shown.
- (✓) C6. Connect the .15 μ fd 1600 V tubular capacitor from lug 2 of terminal strip J (NS) to lug 1 of terminal strip H (S-3). Use sleeving on the lead to terminal strip H.
- (✓) C1. Connect a .5 μ fd tubular capacitor from lug 2 of terminal strip H (NS) to lug 1 of vibrator socket F (S-2). Place the body of this capacitor against the side of the chassis.
- (✓) C3. Connect the other .5 μ fd tubular capacitor between lugs 2 (NS) and 3 (NS) of vibrator socket F. Use 1-1/2" of sleeving on each lead, and place the capacitor body between terminal strips E and C as shown.
- (✓) C8. Connect the 20 μ fd electrolytic capacitor from lug 2 of terminal strip H (S-4) to lug 3 of terminal strip J (NS). Use sleeving on the positive (+) lead, which goes to terminal strip J.

- (✓) RFC2. Connect the 1.1 millihenry RF choke from lug 3 of terminal strip J (NS) to lug 1 of screw terminal strip C (NS).

NOTE: Clamp a pair of long-nose pliers on the diode leads when soldering in the next two steps. This will prevent damage to the diodes by excessive heat.

- (✓) D2. Connect a silicon diode between lugs 1 (NS) and 3 (S-3) of terminal strip J. The positive (+) lead goes to lug 3.
- (✓) D1. Connect the other silicon diode between lugs 1 (S-3) and 2 (S-4) of terminal strip J. The positive (+) lead goes to lug 1.
- (✓) R1. Cut each lead of the 43 Ω (yellow-orange-black) 2 watt resistor to 3/4". Connect this resistor between lug 2 (NS) and lug 4 (S-1 for 12-volt, or S-2 for 6-volt) of vibrator socket F. Place the body of this resistor across the socket as shown.
- (✓) Prepare the four .01 μ fd disc ceramic capacitors by cutting each lead to 1/2".
- (✓) C4. Connect a .01 μ fd capacitor from lug 3 of terminal strip E (NS) to lug 2 of vibrator socket F (S-4 for 12-volt, or S-5 for 6-volt).

- (✓) RFC1. Mount the 10 microhenry RF choke (#45-20) at location G. Position this choke with its lead exits as shown. Note that the slotted lead exit is away from the chassis surface. Use a 6-32 x 1-1/4" screw, two #10 fiber washers (one on each end), a #6 lockwasher, and a 6-32 nut. Do not over-tighten.

Cut the transformer leads to the following lengths. Measure from the point that each lead leaves the transformer.

COLOR	LENGTH
-------	--------

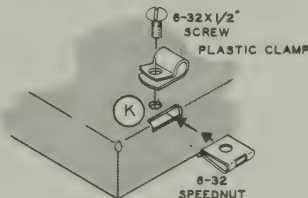
(✓) Red	4-1/4"
(✓) Red-yellow	3-1/2"
(✓) Green	5-3/4"
(✓) Black	5"
(✓) Brown	5"
(✓) Green-yellow	4-1/2"
(✓) Yellow	4-1/4"

- (✓) Strip 1/4" of insulation from the end of each lead and "tin," (Tin means to melt a small amount of solder on the exposed lead end.)

- (✓) Mount the transformer, along with 2-lug terminal strip H and 3-lug terminal strip J, as shown in Detail 1B. The

transformer should be positioned with its red and red-yellow leads toward the end of the chassis. Use two 6-32 x 1/4" screws, two #6 lockwashers, and two 6-32 nuts.

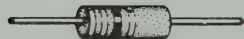
- (✓) Place the red and red-yellow transformer leads through grommet A. Then place the remaining leads through grommet B.
- () Install a 6-32 speednut on each end flange of the chassis. Make sure that the flat side of each speednut faces outward.
- () Similarly, install a 6-32 speednut at K. Place the speednut through the slot in the chassis, with the flat side of the speednut on the top surface of the chassis. See Detail 1C.



Detail 1C

- () Temporarily mount the plastic clamp outside of the chassis at K. Use a 6-32 x 1/2" screw, placed through the plastic clamp and then into the speednut. See Detail 1C. NOTE: This plastic clamp will be used to secure the wires running to the Power Supply after the Power Supply is installed.

PARTS PICTORIAL



RESISTOR



1.1 MH RF CHOKE



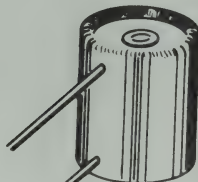
6-32 x 1/2" SCREW



#10 FIBER WASHER



DISC CAPACITOR



10 μ H RF CHOKE



6-32 x 1/4" SCREW



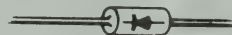
#6 LOCKWASHER



TUBULAR CAPACITOR



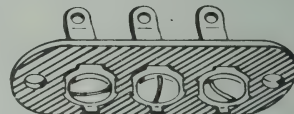
6-32 x 1-1/4" SCREW



SILICON DIODE



6-32 NUT



3-LUG SCREW
TERMINAL STRIP



ELECTROLYTIC CAPACITOR



VIBRATOR CLAMP



6-32 SPEEDNUT



3-LUG
TERMINAL STRIP

- (✓) RFC1. Mount the 10 microhenry RF choke (#45-20) at location G. Position this choke with its lead exits as shown. Note that the slotted lead exit is away from the chassis surface. Use a 6-32 x 1-1/4" screw, two #10 fiber washers (one on each end), a #6 lockwasher, and a 6-32 nut. Do not over-tighten.

Cut the transformer leads to the following lengths. Measure from the point that each lead leaves the transformer.

COLOR	LENGTH
-------	--------

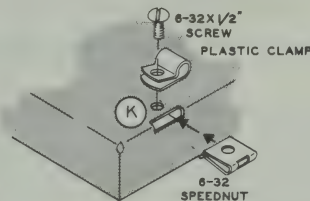
(✓) Red	4-1/4"
(✓) Red-yellow	3-1/2"
(✓) Green	5-3/4"
(✓) Black	5"
(✓) Brown	5"
(✓) Green-yellow	4-1/2"
(✓) Yellow	4-1/4"

- (✓) Strip 1/4" of insulation from the end of each lead and "tin." (Tin means to melt a small amount of solder on the exposed lead end.)

- (✓) Mount the transformer, along with 2-lug terminal strip H and 3-lug terminal strip J, as shown in Detail 1B. The

transformer should be positioned with its red and red-yellow leads toward the end of the chassis. Use two 6-32 x 1/4" screws, two #6 lockwashers, and two 6-32 nuts.

- (✓) Place the red and red-yellow transformer leads through grommet A. Then place the remaining leads through grommet B.
- () Install a 6-32 speednut on each end flange of the chassis. Make sure that the flat side of each speednut faces outward.
- () Similarly, install a 6-32 speednut at K. Place the speednut through the slot in the chassis, with the flat side of the speednut on the top surface of the chassis. See Detail 1C.



Detail 1C

- () Temporarily mount the plastic clamp outside of the chassis at K. Use a 6-32 x 1/2" screw, placed through the plastic clamp and then into the speednut. See Detail 1C. NOTE: This plastic clamp will be used to secure the wires running to the Power Supply after the Power Supply is installed.

Refer to Pictorial 2 for the following steps.

- (✓) Connect the red-yellow transformer lead coming through grommet A to lug 2 of terminal strip H (NS).
- (✓) Connect the red transformer lead coming through grommet A to lug 1 of terminal strip H (NS).
- (✓) Connect the yellow transformer lead coming through grommet B to lug 1 of terminal strip E (NS).
- (✓) Connect the black transformer lead to lug 2 of terminal strip E (NS).
- (✓) Connect the green-yellow transformer lead to lug 3 of terminal strip E (NS).
- (✓) Connect the green transformer lead to lug 4 of terminal strip E (NS).
- (✓) Connect the brown transformer lead to lug 5 of terminal strip E (NS).
- (✓) Place a 3/4" length of sleeving over the lower lead (from hole) of RF choke G. Connect this lead to lug 1 of vibrator socket F (NS).

- (✓) Connect the other lead (from slot) of RF choke G to the lug of terminal strip D (NS).
- (✓) Connect a 5" length of hookup wire from the lug of terminal strip D (S-2) to lug 3 of screw terminal strip C (NS).
- (✓) Connect a 4-1/4" length of hookup wire from lug 2 of terminal strip J (NS) to lug 2 of screw terminal strip C (NS).
- (✓) Connect a 4-3/4" length of hookup wire from lug 2 of terminal strip J (NS) to lug 2 of terminal strip H (NS).
- (✓) Connect a 1-3/4" length of hookup wire from lug 3 of terminal strip E (NS) to lug 2 of screw terminal strip C (NS). Dress this wire, and the transformer leads running to terminal strip E, down against the chassis.

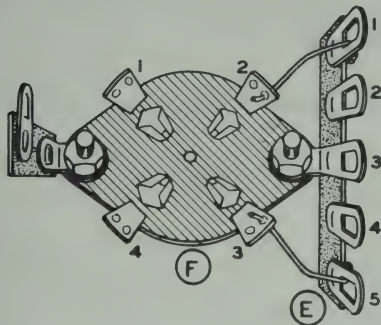
SPECIAL NOTE concerning 12-volt or 6-volt operation:

The following steps are in two specific sections; the first for 12-volt and the second for 6-volt operation. These sections are labeled as such, and the applicable detail is indicated at the beginning of each section.

Be sure to follow the proper steps as determined by your DC voltage requirements.

12-VOLT OPERATION (Refer to Detail 2A).

NOTE: Use stripped hookup wire when bare wire is called for in the next two steps.



Detail 2A

- (✓) Connect a bare wire from lug 3 of vibrator socket F (NS) to lug 5 of terminal strip E (S-2).

- (✓) Connect a bare wire from lug 2 of vibrator socket F (NS) to lug 1 of terminal strip E (S-2).

- (✓) Now solder lugs 2 (S-1) and 4 (S-1) of terminal strip E.

6-VOLT OPERATION (Refer to Detail 2B).

- () Connect a 1-3/4" length of hookup wire from lug 4 (NS) to lug 2 (NS) of vibrator socket F. Dress this wire down against the socket as shown.

NOTE: Use stripped hookup wire when bare wire is called for in the next two steps.

- () Connect a bare wire from lug 3 of vibrator socket F (NS) to lug 4 of terminal strip E (S-2).

- () Connect a bare wire from lug 2 of vibrator socket F (NS) to lug 2 of terminal strip E (S-2).

- () Now solder lugs 1 (S-1) and 5 (S-1) of terminal strip E.

This completes the steps which determine the operating voltage of the Power Supply. The following steps apply to both the 12-volt and 6-volt versions.

Refer to Pictorial 2 for the following steps.

- (✓) Connect the red-yellow transformer lead coming through grommet A to lug 2 of terminal strip H (NS).
- (✓) Connect the red transformer lead coming through grommet A to lug 1 of terminal strip H (NS).
- (✓) Connect the yellow transformer lead coming through grommet B to lug 1 of terminal strip E (NS).
- (✓) Connect the black transformer lead to lug 2 of terminal strip E (NS).
- (✓) Connect the green-yellow transformer lead to lug 3 of terminal strip E (NS).
- (✓) Connect the green transformer lead to lug 4 of terminal strip E (NS).
- (✓) Connect the brown transformer lead to lug 5 of terminal strip E (NS).
- (✓) Place a 3/4" length of sleeving over the lower lead (from hole) of RF choke G. Connect this lead to lug 1 of vibrator socket F (NS).

- (✓) Connect the other lead (from slot) of RF choke G to the lug of terminal strip D (NS).
- (✓) Connect a 5" length of hookup wire from the lug of terminal strip D (S-2) to lug 3 of screw terminal strip C (NS).
- (✓) Connect a 4-1/4" length of hookup wire from lug 2 of terminal strip J (NS) to lug 2 of screw terminal strip C (NS).
- (✓) Connect a 4-3/4" length of hookup wire from lug 2 of terminal strip J (NS) to lug 2 of terminal strip H (NS).
- (✓) Connect a 1-3/4" length of hookup wire from lug 3 of terminal strip E (NS) to lug 2 of screw terminal strip C (NS). Dress this wire, and the transformer leads running to terminal strip E, down against the chassis.

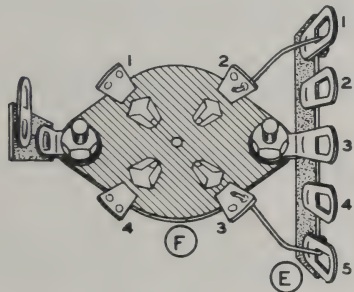
SPECIAL NOTE concerning 12-volt or 6-volt operation:

The following steps are in two specific sections; the first for 12-volt and the second for 6-volt operation. These sections are labeled as such, and the applicable detail is indicated at the beginning of each section.

Be sure to follow the proper steps as determined by your DC voltage requirements.

12-VOLT OPERATION (Refer to Detail 2A).

NOTE: Use stripped hookup wire when bare wire is called for in the next two steps.



Detail 2A

- (✓) Connect a bare wire from lug 3 of vibrator socket F (NS) to lug 5 of terminal strip E (S-2).

- (✓) Connect a bare wire from lug 2 of vibrator socket F (NS) to lug 1 of terminal strip E (S-2).

- (✓) Now solder lugs 2 (S-1) and 4 (S-1) of terminal strip E.

6-VOLT OPERATION (Refer to Detail 2B).

- () Connect a 1-3/4" length of hookup wire from lug 4 (NS) to lug 2 (NS) of vibrator socket F. Dress this wire down against the socket as shown.

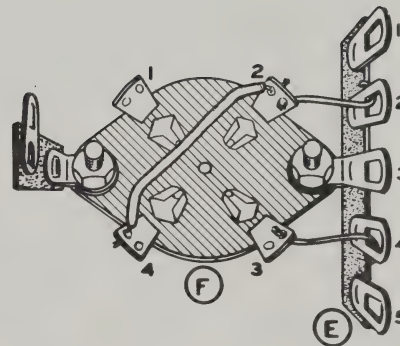
NOTE: Use stripped hookup wire when bare wire is called for in the next two steps.

- () Connect a bare wire from lug 3 of vibrator socket F (NS) to lug 4 of terminal strip E (S-2).

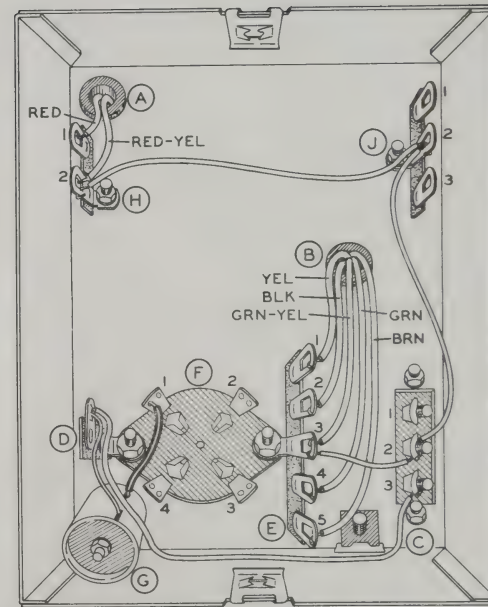
- () Connect a bare wire from lug 2 of vibrator socket F (NS) to lug 2 of terminal strip E (S-2).

- () Now solder lugs 1 (S-1) and 5 (S-1) of terminal strip E.

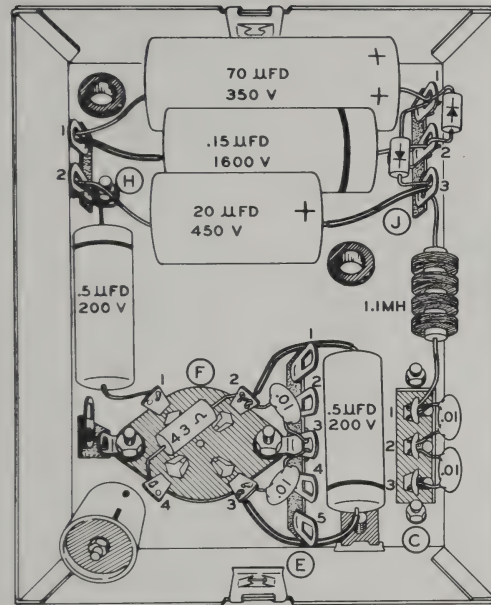
This completes the steps which determine the operating voltage of the Power Supply. The following steps apply to both the 12-volt and 6-volt versions.



Detail 2B



Pictorial 2



Pictorial 3

Refer to Pictorial 3 for the following steps.

NOTE: The positive (+) end of each electrolytic capacitor and the banded (or shouldered) end of each tubular capacitor should be placed as shown in Pictorial 3.

- (✓) C7. Connect the 70 μ fd electrolytic capacitor from lug 1 of terminal strip H (NS) to lug 1 of terminal strip J (NS). The positive (+) lead goes to terminal strip J. Place the body of this capacitor against the end of the chassis as shown.
- (✓) C6. Connect the .15 μ fd 1600 V tubular capacitor from lug 2 of terminal strip J (NS) to lug 1 of terminal strip H (S-3). Use sleeving on the lead to terminal strip H.
- (✓) C1. Connect a .5 μ fd tubular capacitor from lug 2 of terminal strip H (NS) to lug 1 of vibrator socket F (S-2). Place the body of this capacitor against the side of the chassis.
- (✓) C3. Connect the other .5 μ fd tubular capacitor between lugs 2 (NS) and 3 (NS) of vibrator socket F. Use 1-1/2" of sleeving on each lead, and place the capacitor body between terminal strips E and C as shown.
- (✓) C8. Connect the 20 μ fd electrolytic capacitor from lug 2 of terminal strip H (S-4) to lug 3 of terminal strip J (NS). Use sleeving on the positive (+) lead, which goes to terminal strip J.

- (✓) RFC2. Connect the 1.1 millihenry RF choke from lug 3 of terminal strip J (NS) to lug 1 of screw terminal strip C (NS).

NOTE: Clamp a pair of long-nose pliers on the diode leads when soldering in the next two steps. This will prevent damage to the diodes by excessive heat.

- (✓) D2. Connect a silicon diode between lugs 1 (NS) and 3 (S-3) of terminal strip J. The positive (+) lead goes to lug 3.
- (✓) D1. Connect the other silicon diode between lugs 1 (S-3) and 2 (S-4) of terminal strip J. The positive (+) lead goes to lug 1.
- (✓) R1. Cut each lead of the 43 Ω (yellow-orange-black) 2 watt resistor to 3/4". Connect this resistor between lug 2 (NS) and lug 4 (S-1 for 12-volt, or S-2 for 6-volt) of vibrator socket F. Place the body of this resistor across the socket as shown.
- (✓) Prepare the four .01 μ fd disc ceramic capacitors by cutting each lead to 1/2".
- (✓) C4. Connect a .01 μ fd capacitor from lug 3 of terminal strip E (NS) to lug 2 of vibrator socket F (S-4 for 12-volt, or S-5 for 6-volt).

- (✓) C5. Connect a .01 μ fd capacitor from lug 3 of terminal strip E (S-4) to lug 3 of vibrator socket F (S-3).
- (✓) C9. Connect a .01 μ fd capacitor between lugs 1 (S-2) and 2 (NS) of screw terminal strip C.
- () C2. Connect the remaining .01 μ fd capacitor between lugs 2 (S-4) and 3 (S-2) of screw terminal strip C.

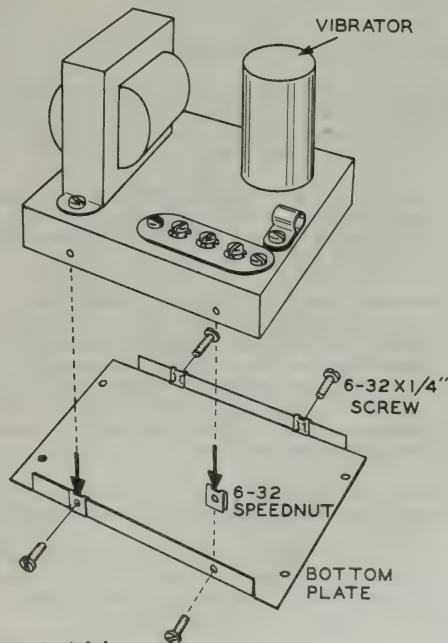
This completes all wiring of the Power Supply. Check each connection to see that it is securely soldered. Also, see that there are no unintentional short circuits.

Refer to Pictorial 4 for the following steps.

- () Install a speednut over each hole in the flanges of the bottom plate. The flat side of each speednut should face outward.
- () Mount the bottom plate to the chassis with 6-32 x 1/4" screws. The screws are placed through the chassis holes into the speednuts as indicated in Pictorial 4.
- () Install the vibrator in its socket. Make sure that the two large pins of the vibrator fit into the two large pin holes of the socket.

NOTE: In the following step, install the identification label where it can easily be seen when needed, but will not show when the unit is in operation. Refer to the numbers on this label in any communications you have with the Heath Company.

- () Carefully peel away the backing paper. Then press the label into position.



Pictorial 4

INITIAL TEST

Refer to Figure 1 for the following steps.

- () Connect a DC voltmeter to the B+ and GND terminals of the Power Supply. The common voltmeter test lead goes to GND. The voltmeter should be set to a high scale, capable of indicating at least 400 volts.
- () Connect a DC power source to the INPUT and GND terminals of the Power Supply. A 6-volt or 12-volt power source may be used, depending on which way your Power Supply is wired. Polarity is not important.
- () Upon connecting the power source, a slight buzzing sound should be heard and the voltmeter should indicate approximately +350 to 400 volts DC. Leave the Power Supply on for two or three minutes. The voltage indication on the meter should not change appreciably in this time. If excessive heating or any other unusual condition is noticed, immediately disconnect the power source and refer to the In Case Of Difficulty section of the manual.
- () If operation seems satisfactory, first disconnect the power source and then the DC voltmeter from the Power Supply.
- () Momentarily short between the B+ and GND terminals of the Power Supply. This will discharge the capacitors, thus eliminating the possibility of being shocked when handling the Power Supply during installation.

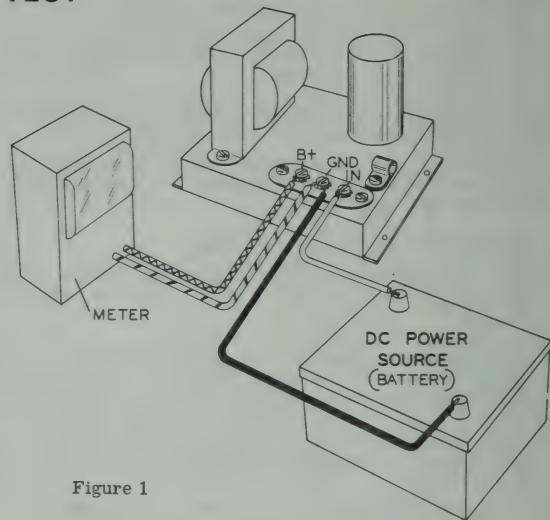


Figure 1

NOTE: The cover will be secured in place after the Power Supply is installed.

INSTALLATION

MOUNTING

The mounting location chosen for the Power Supply should be sheltered from rain and, preferably, should be free of excessive dust circulation. The Power Supply may be mounted in any position. However, the screw terminal strip and both ends of the chassis should be accessible.

Mounting holes are provided in the ends of the bottom plate. Wood screws, sheet metal screws, or nuts and bolts may be used, depending on the type of mounting surface.

WIRING

Figure 2 shows the wiring needed to use the Power Supply. Note that, in this case, the DC power source is turned on and off remotely with an external switch. If desired, a switch could be used in the equipment connected to the Power Supply. Only three wires are needed to use the Power Supply. Use #16 or larger wire for the INPUT and GND. Keep these wires as short as possible. For safety reasons, a fuse should be used in series with the INPUT wire as shown in Figure 2.

The wires running to the screw terminals should be secured in the plastic clamp adjacent to the screw terminal strip.

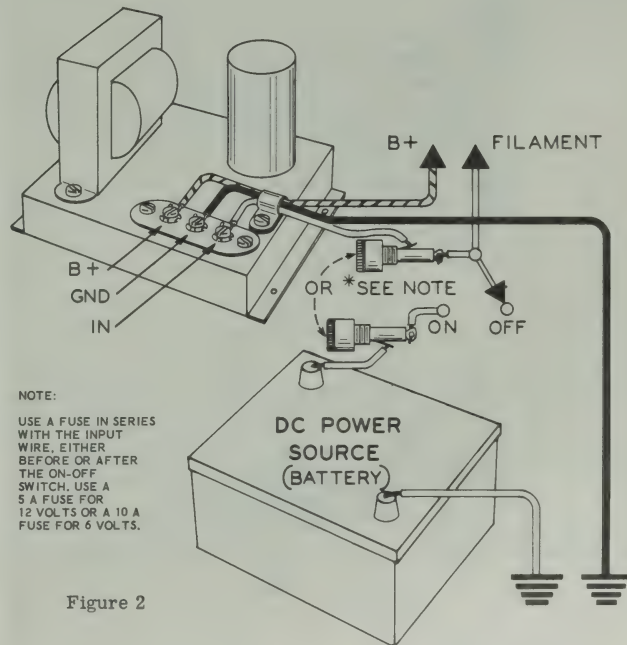


Figure 2

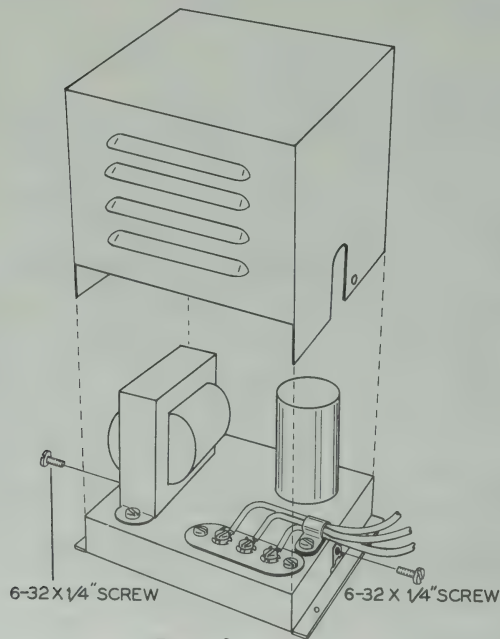


Figure 3

COVER INSTALLATION

Install the cover as shown in Figure 3. Use two 6-32 x 1/4" screws, one for each end of the cover. Each screw should be placed through its hole in the cover and then tightened into the speednut mounted on the chassis. The slot of the cover should fit over the wires running to the Power Supply.

INPUT VOLTAGE CONVERSION

The Power Supply can be changed from 12-volt to 6-volt operation, or vice versa, as follows:

12-VOLT TO 6-VOLT CONVERSION (Refer to Figure 4).

- () Clip out the bare wires presently connected from lugs 2 and 3 of vibrator socket F to lugs 1 and 5 of terminal strip E.
- () Connect a bare wire from lug 2 of vibrator socket F to lug 2 of terminal strip E. Solder both connections.
- () Connect a bare wire from lug 3 of vibrator socket F to lug 4 of terminal strip E. Solder both connections.
- () Connect a 1-3/4" length of hookup wire between lugs 4 and 2 of vibrator socket F. Solder both connections. This wire is intentionally connected across the 43 Ω resistor to facilitate 6-volt operation.

This completes the 12-volt to 6-volt conversion.

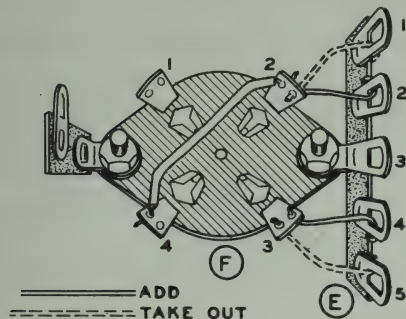


Figure 4

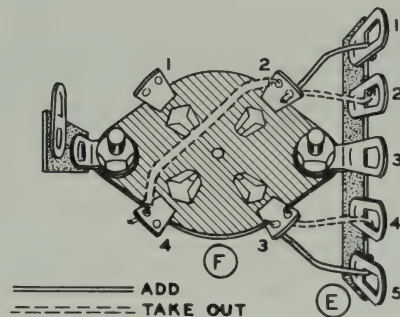


Figure 5

6-VOLT TO 12-VOLT CONVERSION (Refer to Figure 5).

- () Clip out the bare wires presently connected from lugs 2 and 3 of vibrator socket F to lugs 2 and 4 of terminal strip E.
- () Clip out the hookup wire presently connected between lugs 2 and 4 of vibrator socket F.

- () Connect a bare wire from lug 2 of vibrator socket F to lug 1 of terminal strip E. Solder both connections.
- () Connect a bare wire from lug 3 of vibrator socket F to lug 5 of terminal strip E. Solder both connections.

This completes the 6-volt to 12-volt conversion.

IN CASE OF DIFFICULTY

1. Recheck the wiring. Trace each lead in colored pencil on the Pictorial as it is checked. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something consistently overlooked by the constructor.
2. It is interesting to note that about 90% of the kits that are returned for repair, malfunction due to poor connections and soldering. Therefore, many troubles can be eliminated by reheating all connections to make sure that they are soldered as illustrated in the Figures found in the Soldering Techniques section of this manual. Where several leads connect to a terminal, make sure all are properly soldered.
3. Check the values of the component parts. Be sure that the proper part has been wired into the circuit, as shown in the pictorial diagrams and as called out in the wiring instructions.
4. Check for bits of solder, wire ends or other foreign matter which may be lodged in the wiring beneath the chassis.
5. If there is no buzzing sound from the vibrator, check the input connections and primary circuit wiring.
6. If there is a buzzing sound from the vibrator, but no B+, check the secondary circuit for AC voltage (around 100 volts, depending on meter). Check the electrolytic capacitors and diodes for correct polarity, and check RFC2 for continuity.
7. A review of the Circuit Description will prove helpful in indicating where to look for trouble.

SERVICE INFORMATION

SERVICE

If, after applying the information contained in this manual and your best efforts, you are still unable to obtain proper performance, it is suggested that you take advantage of the technical facilities which the Heath Company makes available to its customers.

The Technical Consultation Department is maintained for your benefit. This service is available to you at no charge. Its primary purpose is to provide assistance for those who encounter difficulty in the construction, operation or maintenance of HEATHKIT equipment. It is not intended, and is not equipped to function as a general source of technical information involving kit modifications nor anything other than the normal and specified performance of HEATHKIT equipment.

Although the Technical Consultants are familiar with all details of this kit, the effectiveness of their advice will depend entirely upon the amount and the accuracy of the information furnished by you. In a sense, **YOU MUST QUALIFY** for **GOOD** technical advice by helping the consultants to help you. Please use this outline:

1. Before writing, fully investigate each of the hints and suggestions listed in this manual under In Case Of Difficulty. Possibly it will not be necessary to write.
2. When writing, clearly describe the nature of the trouble and mention all associated equipment. Specifically report op-

erating procedures, switch positions, connections to other units and anything else that might help to isolate the cause of trouble.

3. Report fully on the results obtained when testing the unit initially and when following the suggestions under In Case Of Difficulty. Be as specific as possible and include voltage readings if test equipment is available.
4. Identify the kit Model Number and Series Number, and date of purchase if available. Also mention the date of the kit assembly manual. (Date at bottom of Page 1.)
5. Print or type your name and address, preferably in two places on the letter.

With the preceding information, the consultant will know exactly what kit you have, what you would like it to do for you and the difficulty you wish to correct. The date of purchase tells him whether or not engineering changes have been made since it was shipped to you. He will know what you have done in an effort to locate the cause of trouble and, thereby, avoid repetitious suggestions. In short, he will devote full time to the problem at hand, and through his familiarity with the kit, plus your accurate report, he will be able to give you a complete and helpful answer. If replacement parts are required, they will be shipped to you, subject to the terms of the Warranty.

The Factory Service facilities are also available to you, in case you are not familiar enough with electronics to provide our con-

sultants with sufficient information on which to base a diagnosis of your difficulty, or in the event that you prefer to have the difficulty corrected in this manner. You may return the completed equipment to the Heath Company for inspection and necessary repairs and adjustments. You will be charged a minimal service fee, plus the price of any additional parts or material required. However, if the completed kit is returned within the Warranty period, parts charges will be governed by the terms of the Warranty. State the date of purchase, if possible.

Local Service by Authorized HEATHKIT Service Centers is also available in some areas and often will be your fastest, most efficient method of obtaining service. HEATHKIT Service Centers will honor the regular 90 day HEATHKIT Parts Warranty on all kits, whether purchased through a dealer or directly from the Heath Company; however, it will be necessary that you verify the purchase date of your kit.

Under the conditions specified in the Warranty, replacement parts are supplied without charge; however, if the Service Center assists you in locating a defective part (or parts) in your kit, or installs a replacement part for you, you may be charged for this service.

HEATHKIT equipment purchased locally and returned to Heath Company for service must be accompanied by your copy of the dated sales receipt from your authorized HEATHKIT dealer in order to be eligible for parts replacement under the terms of the Warranty.

THIS SERVICE POLICY APPLIES ONLY TO COMPLETED EQUIPMENT CONSTRUCTED IN ACCORDANCE WITH THE INSTRUCTIONS AS STATED IN THE MANUAL. Equipment that has been modified in design will not be accepted for repair. If there is evidence of acid core solder or paste fluxes, the equipment will be returned NOT repaired.

For information regarding modification of HEATHKIT equipment for special applications, it is suggested that you refer to any one or more of the many publications that are available on all phases of electronics. They can be obtained at or through your local library, as well as at most electronic equipment stores. Although the Heath Company sincerely welcomes all comments and suggestions, it would be impossible to design, test, evaluate and assume responsibility for proposed circuit changes for special purposes. Therefore, such modifications must be made at the discretion of the kit builder, using information available from sources other than the Heath Company.

REPLACEMENTS

Material supplied with HEATHKIT products has been carefully selected to meet design requirements and ordinarily will fulfill its function without difficulty. Occasionally improper operation can be traced to a faulty component. Should inspection reveal the necessity for replacement, write to the Heath Company and supply all of the following information.

- A. Thoroughly identify the part in question by using the part number and description found in the Manual Parts List.
- B. Identify the kit Model Number and Series Number.
- C. Mention date of purchase.
- D. Describe the nature of defect or reason for requesting replacement.

The Heath Company will promptly supply the necessary replacement. PLEASE DO NOT RETURN THE ORIGINAL COMPONENT UNTIL SPECIFICALLY REQUESTED TO DO SO. DO not dismantle the component in question as this will void the guarantee. This replacement policy does not cover the free replacement of parts that may have been broken or damaged through carelessness on the part of the kit builder.

SHIPPING INSTRUCTION

In the event that your equipment must be returned for service, these instructions should be carefully followed.

The vibrator should be in its socket, and the cover and bottom plate should be secured in place.

ATTACH A TAG TO THE EQUIPMENT BEARING YOUR NAME, COMPLETE ADDRESS, DATE OF PURCHASE, AND A BRIEF DESCRIPTION OF THE DIFFICULTY ENCOUNTERED. Wrap the equipment in heavy paper, exercising care to prevent damage. Place the wrapped equipment in a stout carton of such size that at least three inches of shredded paper, excelsior, or other resilient packing material can be placed between all sides of the wrapped equipment and the carton. Close and seal the carton with gummed paper tape, or alternately, tie securely with stout cord. Clearly print the address on the carton as follows:

To: HEATH COMPANY
Benton Harbor, Michigan 49022

Include your name and return address on the outside of the carton. Preferably affix one or more "Fragile" or "Handle With Care" labels to the carton, or otherwise so mark with a crayon of bright color. Ship by insured parcel post or prepaid express; note that a carrier cannot be held responsible for damage in transit if, in HIS OPINION, the article is inadequately packed for shipment.

WARRANTY

The Heath Company warrants that the parts supplied in its kits (except batteries) shall be free of defects in materials and workmanship under normal conditions of use and service. The obligation of Heath under this warranty is limited to replacing or repairing any such part upon verification that it is defective in this manner. This obligation is further limited to such defective parts for which Heath is notified of the defect within a period of ninety (90) days from the original date of shipment of the kit.

The obligation of Heath under this warranty does not include either the furnishing or the expense of any labor in connection with the installation of such repaired or replacement parts. The obligation of Heath with respect to transportation expenses is limited to the cost of shipping the repaired or replacement parts to the buyer, provided such repair or replacement comes within the terms of this warranty.

The foregoing warranty extends only to the original buyer and is expressly in lieu of all other warranties, expressed or implied. The foregoing warranty is further in lieu of all other obligations or liabilities on the part of Heath and in no event shall the Heath Company be liable for any anticipated profits, consequential damages, loss of time or other losses incurred by the buyer in connection with the purchase, assembly or use of the kit product or components thereof.

The foregoing warranty shall be deemed completely void if acid core solder or paste flux or other corrosive solders or fluxes have been used in assembling or repairing the kit product. Heath will not replace or repair any parts of any kit products in which such corrosive solders or fluxes have been used.

This warranty applies only to Heath products sold and shipped to points within the continental United States and to APO and FPO shipments. Warranty replacement for Heath products sold or shipped outside the United States is on an f.o.b. factory basis. Contact the Heath authorized distributor in your country or write: Heath Company, International Division, Benton Harbor, Michigan, U.S.A.

HEATH COMPANY

REPLACEMENT PARTS PRICE LIST

PART No.	PRICE Each	DESCRIPTION
RESISTOR-CAPACITORS		
1-25-2	.35	43 Ω , 2 watt resistor (yellow-orange-black)
21-16	.10	.01 μ fd capacitor-disc ceramic
23-56	.40	.5 μ fd, 200 V capacitor-tubular
23-94	.90	.15 μ fd, 1600 V oil-impregnated capacitor-tubular
25-33	.80	20 μ fd, 450 V capacitor-electrolytic
25-43	1.15	70 μ fd, 350 V capacitor-electrolytic

CHOKES-TRANSFORMER-DIODES		
45-4	.40	RF choke, 1.1 millihenry
45-20	1.45	RF choke, 10 microhenry
55-7	5.00	Transformer
57-27	.60	Silicon diode

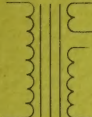

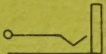

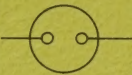



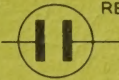
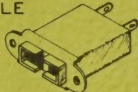
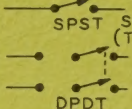
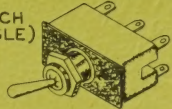
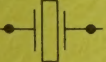



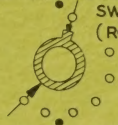


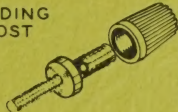

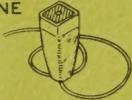






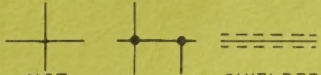
HARDWARE		
250-10	.05	6-32 x 1/2" screw
250-56	.05	6-32 x 1/4" screw
250-79	.05	6-32 x 1-1/4" screw
252-3	.05	6-32 nut
252-22	.05	6-32 speednut
253-6	.05	#10 fiber washer
254-1	.05	#6 lockwasher

PART No.	PRICE Each	DESCRIPTION
CLAMP-SOCKET-TERMINAL STRIPS		
207-5	.10	Plastic clamp
207-6	.20	Vibrator clamp
434-27	.15	Vibrator socket
431-8	.10	3-lug screw terminal strip
431-10	.10	3-lug terminal strip
431-11	.10	5-lug terminal strip
431-15	.10	1-lug terminal strip
431-16	.10	2-lug terminal strip

MISCELLANEOUS		
68-5	2.55	Vibrator
73-1	.10	Rubber grommet
344-6	.05/ft	#18 hookup wire
346-1	.05/ft	Insulating sleeving
200-304-1	.45	Chassis
205-310-1	.40	Bottom plate
90-178-1	1.55	Cover
331-6	.10	Solder
595-448	2.00	Manual

The above prices apply only on purchases from the Heath Company where shipment is to a U.S.A. destination. Selling prices elsewhere in U.S.A. may be slightly higher to offset transportation, taxes, duties and rates of exchange.

TYPICAL COMPONENT TYPES

 <p>POWER TRANS- FORMER</p> 	 <p>PHONE JACK</p> 	 <p>METER</p> 
 <p>INDUCTOR (COIL)</p> 	 <p>RECEPTACLE</p> 	 <p>SPST SWITCH (TOGGLE) DPDT</p> 
 <p>PIEZOELECTRIC CRYSTAL</p> 	 <p>SPEAKER</p> 	 <p>SWITCH (ROTARY)</p> 
 <p>BINDING POST</p> 	 <p>MICROPHONE</p> 	 <p>FUSE</p> 
 <p>GENERAL</p>  <p>LOOP</p>	 <p>EARTH GROUND</p>  <p>CHASSIS GROUND</p>	<p>CONDUCTORS</p>  <p>NOT CONNECTED</p> <p>CONNECTED</p> <p>SHIELDED</p>

HEATH COMPANY

BENTON HARBOR, MICHIGAN

THE WORLD'S FINEST ELECTRONIC EQUIPMENT IN KIT FORM